REMARKS

Reconsideration of the application is requested in view of the amendments and/or remarks provided herein. Claims 3-14, 18, 24-26, and 30-33 remain pending, with claims 6, 8, 10, and 11 being withdrawn from consideration.

§ 102 Rejections

Claims 3-5, 7, 9, 12-14, 18, 24-26, and 32 were rejected under 35 U.S.C. § 102(b) as being anticipated by Dorkin et al. (WO 99/52643, using US 6,478,240 for reference) (collectively "Dorkin"). Applicants respectfully traverse this rejection.

Claims 4, 13, 14, 18, 25-26

Claim 4 recites mixing means for mixing the already-produced mist into a flow of the pressurized gas to produce a discharge in the form of a two-phase mixture comprising a suspension of droplets of the mist in the pressurized gas.

Claim 4 therefore requires that the mist be produced before the introduction of the mist into the pressurized gas, since claim 4 recites "already-produced mist." Dorkin fails to disclose such a limitation.

The Action provides the following description of Dorkin:

> In the Dorkin reference the liquid under pressure (it is pressurized by the gas) flows through the circumferential openings shown in the liquid chamber 9, shown in Figure 2, before interacting with the flowing gas. It is the Examiner's position that the circumferential openings, in the liquid chamber 9, are equivalent to the mist producing means of the device of the present invention, and therefore will inherently perform the same function as the mist nozzle if the liquid is provided at a high enough pressure.

However, there is no description in Dorkin of the nature or function of the circumferential openings shown in the liquid chamber 9 in Figure 2. There is no suggestion given in Dorkin that these openings induce the formation of mist. Moreover, the pressure of the liquid entering into the liquid chamber 9 is restricted. This is because the liquid is expelled from the liquid tank 16 using pressure from the gas tank 15 - the pressure being reduced via the regulator 18 before it is applied to the liquid tank 16.

Moreover, the teaching provided in Dorkin states that the liquid fed from the liquid chamber 9 into the mixing chamber 2 is fed into the mixing chamber 2 as a stream of liquid, rather than as a mist. The relevant teaching of Dorkin, relating to the embodiment shown in Figure 2, is found in the passage extending from line 65 in column 8 to line 7 in column 9. These lines refer to the:

> water streams entering the mixing chamber 2 are caught up by the air flow.

Therefore, water is in the form of a stream, not a mist, as it enters into the mixing chamber 2. Additionally, the relevant passage in Dorkin states that:

> As a result of the procedures in the chamber 2 described a two-phase flow is generated.

The two phase suspension (that is to say the mist) is generated in the mixing chamber 2, not before mixture with the gas, as required by claim 4.

Hence, the teaching in Dorkin discloses that liquid introduced from the tank 16 remains as a liquid (as opposed to a mist) up until it is injected into the mixing chamber 2 in the form of streams. Even if, for the sake of argument, the circumferential openings in the liquid chamber 9 produce a mist as alleged in the Action, then the teaching of Dorkin suggests that the mist has coalesced back into a continuous liquid before it is introduced in the form of streams into the mixing chamber 2. In either scenario, Dorkin fails to disclose the noted limitation of claim 4.

Claim 4 also recites that the pressurised gas is pressurised by being stored under pressure which thus reduces during the flow thereof and reduces the mass flow rate of the gas, and control means including means for applying the pressure of the stored gas to pressurise the liquid extinguishing agent whereby the reducing applied pressure correspondingly reduces the mass flow rate of the liquid extinguishing agent so as to control the ratio of the mass flow rate of the liquid extinguishing agent to the mass flow rate of the pressurised gas towards such a value as to tend to produce a constant droplet size distribution in and for substantially the duration of the discharge.

Claim 4 therefore requires that the ratio of the mass flow rate of the liquid to the mass flow rate of the gas is controlled while both mass flow rates are reducing as a consequence of the reducing gas pressure. Dorkin fails to disclose such a limitation.

The Action provides the following description of Dorkin:

> [A]ccording to Dorkin, the regulator 18 decreases the pressure of the gas that is exiting the gas tank to a particular range, not a specific value (column 7, lines 18 to 21). When the pressure in the tank is at its initial pressure, the pressure of the gas leaving the tank is at the top of the said range, but when the pressure of the gas in the tank reduces (as it inherently will once gas leaves the tank), the pressure of the gas leaving the tank will fall from the top of the range to the bottom of the range, thereby inherently reducing the mass flow rate of the gas.

However, there is no support for this statement in Dorkin. This appears to be speculation. Lines 18 to 21 of column 7 of Dorkin simply state that:

> The air enters the reducer 18 controlling (decreasing) the pressure level in a particular range.

There is no disclosure or suggestion whatsoever in Dorkin that the pressure of the gas leaving the reducer 18 falls from the top of a range to the bottom of a range, as alleged in the Action. Nor has the Action cited any secondary reference that would lead a skilled person to expect such a reduction in pressure.

The sentence quoted above from lines 18 to 20 of column 7 of Dorkin is reasonably interpreted to mean that the reducer 18 reduces the pressure of the gas that exits the reducer 18 to a constant specific value which falls within a particular range, the particular range being a range of pressures suitable for the mixing chamber 2 and the nozzle 1. There is no suggestion in the quoted sentence that there is any variation in the pressure of the gas exiting the regulator 18.

In fact, the user of the reducer 18 disclosed by Dorkin teaches away from controlling the ratio of the mass flow rate of the liquid to the mass flow rate of the gas is controlled while both mass flow rates are reducing as a consequence of the reducing gas pressure, as required by claim 4. A regulator, such as the reducer 18 disclosed by Dorkin, provides a constant pressure and thus mass flow irrespective of the pressure feeding it (within the limits of the regulator). Regulators are expensive and, if used within an entire system, would be cost prohibitive.

In contrast, the control means recited in claim 4 allows the gas flow to decay using either a fixed orifice valve or a constant flow "valve" (which is much cheaper than a regulator) and match the flow of liquid during the discharge thus providing a constant water droplet size throughout the discharge. In other words, in Dorkin, the user sets the nozzle to a pre-determined

flow of gas and water to provide the type of mist best suited for the application. The reducer disclosed by Dorkin ensures that the flows and therefore the droplet size are maintained. In contrast, the control means of claim 4 achieves a constant mass flow of gas / water within a decaying stream of gas.

Claim 4 is patentable over Dorkin for these reasons. Reconsideration and allowance of claim 4, as well as the claims that depend therefrom, are therefore requested.

Claims 3, 5, 7, 9

Claim 5 recites mixing means for mixing the already-produced mist into a flow of the pressurised gas. Claim 5 is therefore allowable for at least similar reasons to those provided above for claim 4.

In addition, claim 5 recites that the control means includes controllable valve means for adjusting the mass flow rate of the liquid extinguishing agent during the discharge.

The Action states that the valve 19 shown in Figure 1 of Dorkin reads on this limitation of claim 5. However, this appears to be incorrect, as there is no discussion of the valve 19 in Dorkin and no disclosure that it is capable of adjusting the mass flow rate of the liquid during the discharge.

Reconsideration and allowance of claim 5, as well the claims that depend therefrom, are requested.

Claim 12

Claim 12 recites mixing means for mixing the already-produced mist into a flow of the pressurised gas. Claim 12 is therefore allowable for at least similar reasons to those provided above for claim 4.

In addition, claim 12 recites means for initiating the flow of the liquid extinguishing agent before initiating the flow of the gas. For at least the following reasons, Dorkin fails to disclose or suggest such a limitation.

The Action provides the following description of Dorkin:

> In the specification of Dorkin, it is specifically disclosed that the air supply valve opens after the water supply valve (column 7, lines 40 to 45) because of a gap

> between the stop 35 and the opposite supporting surface. Because of that gap, the liquid has to begin flowing into the mixing chamber before the gas begins to flow into the mixing chamber, which means that the liquid flow is initiated before the gas flow.

However, Dorkin is incapable of operating in the way suggested in the Action. The gap and the stop 35 referred to in the Action will not to cause liquid flow to be initiated first, as alleged in the Action, but will cause gas flow to be initiated first. The following is a detailed discussion of the operation of the apparatus of Dorkin.

Lines 40 to 45 of column 7 of Dorkin, as referred to in the Action, relate to the embodiment shown in Figure 1 of Dorkin. The operation of the embodiment shown in Figure 2 is the same. Looking at the embodiment in Figure 1, the chamber 9 is the liquid chamber (line 36 of column 6). The chamber 8 is the gas chamber (line 36 of column 6). The liquid chamber 9 is closed by the closure member 6 (lines 56 and 57 of column 7). The gas chamber 8 is closed by a closure member 5 (lines 41 and 42 of column 6). Both the closure member 5 and the closure member 6 are mounted on a common rod 7.

The closure member 5 (which closes the gas chamber) is rigidly fixed to the rod 7 so that the closure member 5 will start to move as soon as the rod 7 starts to move (line 41 of column 6). On the other hand, the closure member 6 (which closes the liquid chamber 9) is fixed on the rod 7 so as to be displaceable along the rod 7 (lines 43 and 44 of column 6). The closure member 6 is urged towards the right as shown in Figure 1 by a spring. As stated in line 48 of column 6, the spring urges the closure member 6 to the seat of the liquid chamber 9.

A stop 12 is fixedly attached to the rod 7 and is positioned on the rod 7 to the right of the closure member 6 of the liquid chamber 9.

In operation, in order to open the liquid chamber 9 and the gas chamber 8, the rod 7 has to be displaced to the left as shown in Figure 1. As the rod 7 moves to the left, the closure member 5 of the gas chamber will move immediately as soon as the rod 7 starts to move, because the closure member 5 is fixedly attached to the rod 7. This causes immediate release of gas from the gas chamber 8 into the mixing chamber 2. On the other hand, as the rod 7 starts to move to the left, the closure member 6 of the liquid chamber 9 will remain in position against the seat of the liquid chamber 9 because the closure member 6 is movable along the rod 7 and because the spring urges the closure member 6 to the seat of the liquid chamber 9. The closure

member 6 will not begin to leave the seat of the liquid chamber 9 until the stop 12 provided on the rod 7 contacts the closure member 6 and pushes the closure member 6 to the left, as shown in Figure 1, away from the seat of the liquid chamber 9. Hence, there will be a delay between the rod 7 starting to move and opening of the liquid chamber 9.

Therefore, the structure of the apparatus of Dorkin requires that gas will start to flow from the gas chamber 8 into the mixing chamber 2 before liquid starts to leave the liquid chamber 9. This is the direct opposite to what is claimed in independent claim 12. Reconsideration and allowance of claim 12 are therefore requested.

Claim 18

Claim 18 recites the pressurised gas is pressurised by being stored under pressure which thus reduces during the flow thereof and reduces the mass flow rate of the gas, and wherein said controlling of said ratio to produce said constant droplet size distribution in and for substantially the duration of the discharge is achieved at least partially by applying the pressure of the stored gas to pressurise the liquid extinguishing agent whereby the reducing applied pressure correspondingly reduces the mass flow rate of the liquid extinguishing agent as the mass flow rate of the gas undergoes said reduction thereof. Claim 18 is therefore allowable for at least similar reasons to those provided above. Reconsideration and allowance are requested.

Claim 24

Claim 24 recites initiating the flow of the liquid extinguishing agent before initiating the flow of the gas. As such, claim 24 is allowable for at least reasons similar to those provided above for claim 12. Reconsideration and allowance are requested.

Claim 32

Claim 32 recites causing the liquid and the gas to flow simultaneously along a common pipe to a nozzle so that a two-phase mixture comprising droplets of the liquid suspended in the gas is discharged from the nozzle.

The Action provides the following description of Dorkin:

> [T]he common pipe that the liquid and the gas flow mixture flow along is being considered element 1 of Dorkin, and the nozzle is being considered the outlet of element 1.

This interpretation of Dorkin is incorrect. In Dorkin, the whole of the element 1 is quite clearly a nozzle. For example, the third line of the abstract refers to element 1 as a "gas-dynamic nozzle." Lines 12 and 13 of column 3 of Dorkin state that the nozzle is mounted on the mixing chamber. There is no pipe preceding the nozzle, as required by claim 32 of the current application. Similarly, lines 11 and 12 of column 5 and lines 3 and 4 of column 8 of Dorkin teach that the nozzle is directly connected to the mixing chamber 2.

The Action suggests that the outlet alone of nozzle 1 of Dorkin should be considered to be a nozzle in itself. This is clearly incorrect as the outlet cannot be considered to be a nozzle within the normal meaning of the word.

Moreover, at the end of the paragraph bridging pages 4 and 5 of the Action, the Action acknowledges that Dorkin does not specifically teach causing the liquid and gas to flow simultaneously along a common pipe to a plurality of nozzles. This further illustrates the lack of teaching in Dorkin.

Reconsideration and allowance of claim 32 are therefore requested.

§103 Rejections

Claims 30 and 31

Claims 30 and 31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Dorkin in view of Russwurn (US 6,173,790). Applicants respectfully traverse this rejection.

As discussed above, Dorkin fails to disclose or suggest every limitation of claims 4 and 18. Russwurn fails to remedy the deficiencies of Dorkin as it relates to claims 4 and 18. Therefore, claims 30 and 31 are allowable for at least the reason they are dependent upon an allowable base claim. Applicants do not otherwise concede the correctness of this rejection.

Claims 32 and 33

Claims 32 and 33 were rejected under 35 U.S.C. §103(a) as being unpatentable over Dorkin in view of Sundholm (US 5,845,713). Applicants respectfully traverse this rejection.

First, there is no motivation for the skilled person to adapt the Dorkin apparatus by providing a pipe and a plurality of nozzles as disclosed in Sundholm. Second, such an adaptation would be rejected by the skilled person because it would make the Dorkin apparatus inoperable.

The apparatus disclosed in Dorkin, when used for the purposes of fire fighting, is a portable apparatus. For example, lines 19 to 21 of column 3 of Dorkin state that the nozzle is provided with a handle. Lines 14 to 16 of column 4 of Dorkin state that the tank and the bottle can be placed in a back-pack or on transport means such as a trolley, an automobile or an electromobile. As the apparatus and nozzle of Dorkin is clearly a mobile apparatus with a handheld nozzle/mixing device, the incorporation of a distribution pipe with several nozzles would make the apparatus unwieldy and unusable. Clearly, in the context of a handheld nozzle, the nozzle needs to be as compact as possible to allow ease of use.

Further, the two documents are incompatible. The mixing device/nozzle of Dorkin quite clearly produces a mist - that is to say, a suspension of liquid droplets in a gas. On the other hand, the apparatus of Sundholm only produces a mist once the mixture of the gas and the liquid reaches the spray heads. Reference is made, for example, to lines 42 and 43 of column 1 of Sundholm which state "extinguishing liquid delivered to the spray heads to produce a finely divided liquid mist."

The teaching of Sundholm suggests that within the distribution pipe 2, prior to delivery to the spray heads 3, the gas is present in the form of bubbles within a continuous liquid phase. For example, line 33 of column 1, lines 41 and 42 of column 1, lines 66 and 67 of column 1, lines 2 and 3 of column 2 and line 40 of column 2 all refer to mixing gas into a liquid - hence suggesting the formation of a mixture of bubbles within a liquid.

Therefore, in Sundholm, the pipe 2 is intended to carry a mixture of bubbles within a liquid - that is to say bubbles within a continuous liquid phase. In Dorkin, the arrangement is directly opposite as the mixing chamber and the nozzle produce a discharge in the form of a mist - that is, liquid droplets in a continuous gas phase. There is no indication whatsoever that the pipe 2 and the spray heads 3 of Sundholm would be suitable for transporting the mist.

Reconsideration and allowance of claim 32, as well as claim 33 that depends therefrom, are therefore requested.

Conclusion

In view of the above, Applicants request reconsideration of the application in the form of a Notice of Allowance. If a phone conference would be helpful in resolving any further issues related to this matter, please contact Applicants' attorney listed below at (612) 336.4771.

The Commissioner is hereby authorized to charge any additional fees as set forth in §§ 38 CFR 1.16 to 1.18 which may be required for entry of these papers or to credit any overpayment to Deposit Account No. 13-2725.

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